

IN THE CLAIMS:

1. (Currently Amended) A divider of a higher-radix type for obtaining a quotient by referring to a divisor and a dividend normalized respectively so as to satisfy a range of $1/2^K$ $1/2^{K+1}$ or more and less than $4/2^{K+1}$ $1/2^K$ (k being a positive integer), and to a length of bits defined by a radix for operations and a maximum number of digits in all bits of a partial remainder, comprising:

a scaling factor generating section means to generate a multiplication factor used for performing a scaling so that said divisor falls within a specified range;

a multiplying section means to multiply each of said divisor and said dividend by said multiplication factor;

a divisor tripled-number generating means section to generate a tripled number of said divisor which has been multiplied by the multiplication factor;

a repetitive operating section means to do division repeatedly by using said divisor and said dividend which has been multiplied by the multiplication factor and said tripled number of said divisor; and

wherein said repetitive operating section means produces a quotient by generating high-order bits of 4-bit partial remainder represented in a two's complement notation by referring to a number of high-order bits, with an arbitrary length, of said partial remainder and by referring to high-order 4 bits of said partial remainder, and

wherein said scaling factor generating means generates said multiplication factor so that said divisor falls within a range of $5/3 \times 1/2^{K+1}$ or more and less than $7/4 \times 1/2^K$

2. (Cancelled)

3. (Currently Amended) A divider of a higher-radix type for obtaining a quotient by referring to a divisor and a dividend normalized respectively so as to satisfy a range of $1/2^K$ $1/2^{K+1}$ or more and less than $1/2^{K+1}$ $1/2^K$ (k being a positive integer), and to a length of bits defined by a radix for operations and a maximum number of digits in all bits of a partial remainder, comprising:

a scaling factor generator to generate a multiplication factor used for performing a scaling so that said divisor falls within a specified range;

a multiplier to multiply each of said divisor and said dividend by said multiplication factor;

a divisor tripled-number generator to generate a tripled number of said divisor which has been multiplied by the multiplication factor;

a repetitive calculator to do division repeatedly by using said divisor and said dividend which has been multiplied by the multiplication factor and said tripled number of said divisor; and

wherein said repetitive calculator produces a quotient by generating high-order bits of 4-bit partial remainder represented in a twos complement notation by referring to a number of high-order bits, with an arbitrary length, of said partial remainder and by referring to high-order 4 bits of said partial remainder, and

wherein said scaling factor generator generates said multiplication factor so that said divisor falls within a range of $5/3 \times 1/2^{K+1}$ or more and less than $7/4 \times 1/2^{K+1}$.

4. (Cancelled)

5. (New) A divider of a higher-radix type for obtaining a quotient by referring to a divisor and a dividend normalized respectively so as to satisfy a range of $1/2^{K+1}$ or more and less than $1/2^K$ (K being a positive integer), and to a length of bits defined by a radix for operations and a maximum number of digits in all bits of a partial remainder, comprising:

a scaling factor generating means for generating a multiplication factor used for performing a scaling so that said divisor falls within a specified range;

a multiplying means to multiply each of said divisor and said dividend by said multiplication factor;

a divisor tripled-number generating means to generate a tripled number of said divisor which has been multiplied by the multiplication factor; and

a repetitive operating means for repeatedly dividing by using said divisor and said dividend which has been multiplied by the multiplication factor and said tripled number of said divisor, said repetitive operating means comprises a redundant to non-redundant converting means, a selecting means, a 4-bit binary adding means, and a redundant binary adding means,

wherein, said repetitive operating means produces a quotient by generating high-order bits of 4-bit partial remainder represented in a twos complement notation by referring to a number of high-order bits, with an arbitrary length, of said partial remainder and by referring to high-order 4 bits of said partial remainder.

6. (New) The divider according to Claim 1, wherein in said repetitive operating means, said selecting means selects one out of seven kinds of multiples, minus-tripled number (+3 multiple, +2 multiple, +1 multiple, 0 multiple, -1 multiple, -2 multiple, and -3 multiple) of the quotient, in accordance with output from a logic circuit for deciding quotient,

said redundant to non-redundant converting means inputs high-order 2 bits of a redundant portion and low-order 2 bits of a non-redundant portion represented in twos complement notation, in partial remainder obtained as a result of an operations cycle of last time, and then converting them to 4 bits of non-redundant data, and

said 4-bit binary adding means performs addition and/or subtraction of carry over input between high-order 4 bits in the multiples of quotient output from said selecting means and a 4 bits of non-redundant data output from said redundant to non-redundant converting means, reflecting carry over input fed from said addition and/or subtraction between data other than high-order 4 bits in a redundant portion of said partial remainder and data other than high-order 4 bits in the multiples of quotient output from said selecting means.

7. (New) A divider of a higher-radix type for obtaining a quotient by referring to a divisor and a dividend normalized respectively so as to satisfy a range of $1/2^{K+1}$ or more and less than $1/2^K$ (k being a positive integer), and to a length of bits defined by a radix for operations and a maximum number of digits in all bits of a partial remainder, comprising:

a scaling factor generator to generate a multiplication factor used for performing a scaling so that said divisor falls within a specified range;

a multiplier to multiply each of said divisor and said dividend by said multiplication factor;

a divisor tripled-number generator to generate a tripled number of said divisor which has been multiplied by the multiplication factor;

a repetitive calculator to do division repeatedly by using said divisor and said dividend which has been multiplied by the multiplication factor and said tripled number of said divisor; and

wherein said repetitive calculator comprises a redundant to non-redundant converter, a selector, a 4-bit binary adder, and a redundant binary adder, said selector selecting one out of seven kinds of multiples, minus-tripled number (+3 multiple, +2 multiple, +1 multiple, 0 multiple, -1 multiple, -2 multiple, and 3-multiple) of the quotient, said redundant to non-redundant converter inputting high-order 2 bits of a redundant portion and low-order 2 bits of a non-redundant portion represented in two's complement notation, in partial remainder obtained as a result of an operational cycle of last time, and then converting them to 4 bits of non-redundant data, said 4-bit binary adder performing addition and/or subtraction of carry over input between high-order 4 bits in the multiples of quotient output from said selector and said 4 bits of non-redundant data output from said redundant binary adder, said redundant binary adder performing addition and/or subtraction between data other than high-order 4 bits in a redundant portion of said partial remainder and data other than high-order 4 bits in the multiples of quotient output from said selector,

thereby producing a quotient by generating high-order bits of 4-bit partial remainder represented in a twos complement notation by referring to a number of high-order bits, with an arbitrary length, of said partial remainder and by referring to high-order 4 bits of said partial remainder.